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ENVIRONMENTAL PROTECTION AGENCY
DIV. OF WATER POLLUTION CONTROL
PERMIT SECTION - SPRINGFIELD
STATE OF ILLINOIS

CABOT CORPORATION P. O. BOX 1101, PAMPA, TEXAS 79065

CABLE ADDRESS "CABLAK" PAMPA
PHONE 669 – 2581 (AREA CODE 806)

55-72

September 9, 1974

See Page 3 Note
& attached letter
of Sept 6, 74 to WHB

Mrs. Carolyn Cates
Region V, Permit Branch
U. S. Environmental Protection Agency
1 North Wacker Drive
Chicago, Illinois 60606

Subject: Permit No. IL 072 OYE 2 000712
Joint Public Notice No. 41I-0241-A
Cabot Corporation, Tuscola, Illinois

Dear Mrs. Cates:

We have received the proposed authorization to discharge under the National Pollutant Discharge Elimination System, dated August 21, 1974. There are several items in the proposed permit which we feel we should call to your attention:

At the Cabot Plant in Tuscola in our Cab-O-Sil process, we are making fumed silicon dioxide. A by-product from this Cab-O-Sil process is hydrochloric acid which, under normal conditions, we are able to recover and to sell as a 31.5% solution.

There is a waste stream from this process which contains dilute hydrochloric acid and silicon compounds. This waste solution, 70 to 100 gpm, is normally at a pH value of less than 1 and contains 1.3 to 2.5% HCl and about 1% silica. The dissolved chloride content ranges from 16,000 to 35,000 mg/l, normally 27,000 mg/l, and suspended solids are decreased in settling ponds to a level of from 630 to 5400 mg/l prior to injection in the well. Normally, the total suspended solids are maintained at less than 1500 mg/l in order to avoid taking matter to the disposal well, which could later act as an obstruction to flow.

The analyses which have been done for iron on this waste stream indicate total iron varies from 0.08 to 0.87 mg/l, average 0.13 mg/l, and dissolved iron varies from 0.025 to 0.062 mg/l. Our original Corps of Engineers discharge permit application showed higher values (maximum 1100 ppm) total iron content, based on incomplete data. Subsequent tests have indicated that this high level has not been attained since.

There have been conditions in the past where it was necessary to discharge a portion of the full strength (31.5%) acid into the well due to contamination with the silicon dioxide product. The Cab-O-Sil is marketed for its unusual properties, i.e., a fractional percentage of Cab-O-Sil in an aqueous medium may form a firm, stable gel. These properties make the material almost impossible to remove from solution.

Considerable study and attention has already been devoted to the surface treatment and disposal of this waste stream. Treatment by the generally accepted methods of electro-dialysis, reverse osmosis and ion exchange are complicated by several factors. The pH of the waste stream is low and would require substantial quantities of an alkali to neutralize. The alkali addition would add to the already significant dissolved solids content and the dissolved silica would, on neutralization, hydrolyze and precipitate a high volume, low solids gelatinous mass which would render filtration and settling as near impossibilities.

"Wastewater Treatment Technology" by J. W. Patterson and R. A. Minear, Illinois Institute for Environmental Quality, Chicago, Illinois, NTIS PB 204 521, August 1971 on page 251 and pages following discusses the treatement of chloride wastes (not complicated by the presence of dissolved silica) and recommends either deep well disposal or solar evaporating ponds. They find our dissolved solids level to be too high for ion exchange to have applicability. Figure 3 on page 257 shows that the cost of ion-exchange treatment is prohibitive if the total dissolved solids are present in excess of 1000 mg/1. They report only a 30% removal of chloride in Table 2, page 259 by electro-dialysis. Their starting concentration was 115 mg/1 and they acknowledge high treatment costs (to $1.34/1000 gallons, table 4, page 260) for these methods. The small size of the chloride ion renders it less amenable to treatment by reverse osmosis than would be the treatment of other ions of larger size.

None of the above methods, ion exchange, electro-dialysis, reverse osmosis or evaporation answers the ultimate question, and that is - What should be done with the water soluble concentrate which will be generated in each case?

Evaporative techniques are complicated by several factors. The low pH would require specialized materials of construction. The silica-containing products would tend to accumulate on and foul heat-exchange surfaces. We already are operating this plant under curtailed energy conditions.

A further discussion of the treatment of chloride wastes can be found in the "development Document for Proposed Effluent Limitation Guidelines and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category" EPA 440/1-73/007, August 1973, on page 305 and following pages,

in the section dealing with titanium dioxide via the chloride process. Again, the accepted procedures involve deep-welling, ocean barging or neutralization and discharge of the saline waste to surface streams.

This Cab-O-Sil waste disposal problem is complicated somewhat by the fact that we are also disposing of untreatable wastes for A. E. Staley Manufacturing Company (1,894,400 pounds last year) and for R. R. Donnelley Company (1,264,600 pounds last year).

The Staley waste is a starch by-product consisting of chlorides, corn starch and sulfates as a 4% solution in water. Staley has worked diligently to recycle most of the starch values to their process and no waste has been disposed of for Staley since early this year.

We have worked closely with the Illinois EPA and the Illinois State Geological Survey in the development and continued use of our disposal well. On January 8,1974, we met with Mr. Curtis Ogg, Mr. Ward Akers and Mr. R. E. Bergstrom of the Illinois EPA, Mr. Ross D. Brower of the State Geological Survey and Mr. Adrain P. Visoky and Mr. Richard Schicht of the Illinois State Water Survey, to discuss the existing well and to discuss the prospects and requirements for drilling a second stand-by well. A copy of Mr. Aker's report of this meeting is attached (Attachment 1).

We will continue as a normal, prudent part of our operations to attempt to recover and sell a greater portion of the by-product acid and to decrease the quantity of silica lost to the waste stream. We will continue to keep you informed of the quantities of waste products which are being injected to the well. We are at a loss, however, to provide, at this time, a meaningful proposal for treatability studies for surface treatment of the wastewater which is currently being discharged to the well.

We are enclosing a copy (attachment 2) of my letter of August 12, 1974 to Mr. A. H. Manzardo in which I called attention to some minor points which still apply to this proposed permit.

We are enclosing (attachment 3) a copy of my letter to Mr. William H. Busch, Illinois Environmental Protection Agency, in which we are petitioning for the Chapter 3, Section 404 (f) (ii) exemption to apply to our 001 outfall.

On August 15, 1974, we mailed to Mr. A. H. Manzardo the information required in page 16 of 18, Part III, other requirements, of the proposed permit.

In summary, we respectfully request that, because surface treatment of our by-product waste is not technically feasible, because

of the substantial energy requirements for alternative methods, such as reverse osmosis and evaporative procedures, because there is no suitable alternative means of disposing of any saline concentrate which would result and because the costs of these alternative processes appear prohibitive, we not be required to submit a proposal for research and pilot plant study of these treatment procedures.

Further, we request that we not be required to monitor for total or dissolved iron in the waste stream which is injected to the well. The deep well injection system is not, at present, equipped to continuously monitor for temperature and for pH. We request that we be permitted to determine these parameters on a grab-sample basis for approximately six months until suitable monitors can be procured and installed.

Very truly yours,

CABOT CORPORATION

D. J. Robinson, Ph. D
Corporate Environmental
Control

DJR/pc
Attachment 1 Illinois Environmental Protection Agency Letter of February 14, 1974 - Application Procedure for Industrial Waste Disposal Well
Attachment 2 DJRobinson letter of August 12, 1974 to AHMenzardo USEPA Chicago Office
Attachment 3 DJRobinson letter of September 6, 1974 to WHBusch IEPA Petition for Exemption
cc: Mr. Irving Jakowski
Region V, Permit Branch
Chicato, Illinois 60606

Mr. William H. Busch, Permit Services
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706